COOP'S TECHNOLOGY DIGEST

-A Timely Report On The World Of Communications-

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February 10, 1997 / ISSUE 97-01-34

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REACHING CTD: Telephone (64) (0)9-406-0651; 24 HOUR FAX (64) (0)9-406-1083

NEXT ISSUE DATE: March 19, 1997

COOP'S TECHNOLOGY DIGEST / SUBSCRIPTION INFO

There are ten (10) issues per year on a schedule dictated by industry events. The readership includes telecommunication industry consultants, broadcasters/telecasters, brown goods importers, retail stockists, installation and maintenance firm personnel, educators, regulatory agencies, business investors and Arthur C. Clarke. All copies sent via airmail / Fast Post. Annual subscription NZ$250 per year within New Zealand, US$250 per year outside. In Australia, CTD is represented exclusively by AV-COMM Pty Ltd, PO Box 225, Balgowlah NSW 2093: Tel. (61) 2-9949-7417; Fax. (61) 2-9949-7095. Outside of Australia, make payment out and mail to:

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COOP'S TECHNOLOGY DIGEST

February 10, 1997 ◆ VOLUME 97-1-34

A Battle For Microwave Frequencies

Within the vast electromagnetic spectrum discrete frequencies are "blocked" (designated) for use by various categories of users - the military, for example, would be such a category. Block allocations are made first on a national (New Zealand or Australia) level and then co-ordinated with various international boards to ensure there will be no conflicts (interference) from or to services originating beyond the borders of a specific country. The Ministry of Commerce carries the responsibility for this process.

'BS' (before satellites) it was generally accepted that any frequencies greater than 50 MHz (megahertz) were unlikely to travel outside of New Zealand and the Ministry took the educated position that it could assign blocks above that frequency with a high degree of immunity in respect to what other nations might be doing with similar frequency bands. The rationale here is that VHF (very high frequency) and UHF (ultra high frequency) and SHF (super high frequency - microwave) transmissions are by their nature essentially "line of sight" transmissions and coverage is limited to the region defined as being "visible" from the transmitter location. If a transmitter located on the highest spot in New Zealand cannot 'reach' any other land mass when operating above 50 megahertz, there is little (perhaps no) reason to 'co-ordinate' with other jurisdictions. The isolation (as in being surrounded by vast expanses of water) of New Zealand and Australia helps this procedure work.

Satellites present new problems. A satellite operates from a location far higher than even the tallest point of land in New Zealand and if the satellite carries transmitters which operate in the VHF or UHF or SHF range, it is entirely possible that signals from these transmitters will be present in some or all of our countryside.

Co-ordination of such VHF, UHF and SHF blocks is done through a voluntary International Frequency Registration Board (IFRB). New Zealand and other nations submit to this procedure because it is a two-way process. If we elect to ignore this procedure, other nations will in the future be less considerate of New Zealand requests to protect our own similar frequency uses beyond our borders. The IFRB has functioned in one form or another since the mid 1920s.

World Administrative Radio Conferences (abbreviated WARC) involves meetings of representatives of individual nations who attempt to create 'block assignments' for regional or world-wide allocation. For decades WARC met as infrequently as 10 year intervals, more recently every 4 years and presently every other year. The complexity of co-ordinating frequency bands for world-wide use has grown proportional to the development of new satellite system technologies. The demands for world-wide frequency space by such new systems as Iridium has become a major issue. A space user such as Iridium must have assured access to frequencies before design work on the satellite system can begin. Without a frequency allocation, nothing significant can get underway to create such a communication service.

The 12 GHz Ku Band

WARC meetings begun in the late 1970s, solidified in the early 1980s, established on a world-wide basis that SHF spectrum in the region of 12 GHz (gigahertz - 12,000 megahertz) would be allocated for satellite to earth "broadcast television reception" on a pre-emptive basis. That is, such a use of this frequency band would take precedence over other uses. New Zealand ratified this assignment.

The satellite to earth "reserved" frequency segment is slightly different for the various regions of the world. For this reason satellite operators such as PanAmSat create versatile satellite designs capable of transmitting in two or more Ku-band frequency bands - only one or two of which will be "legally usable" to a country such as New Zealand. Ku-band WARC recognised IFRB registered frequencies for New Zealand and Australia include 12,250 to 12,750 MHz (12.25 - 12.75 GHz) plus 11.7 to 12.2 GHz.

Eliminating terrestrial users from satellite to earth bands is critical to the success of a satellite service. Satellite signals as received on earth are engineered to be just strong enough to produce the desired link (connection) and there is virtually no room for interference. Terrestrial signals in the same frequency band are to be avoided - indeed, it is the elimination of any such terrestrial signals which forms the basis for the IFRB / WARC process. As a practical matter, terrestrial signals existing within the space to earth frequency band almost guarantee that the band will be unusable for the intended satellite purpose. (**1**)

Having gone to this much effort to ensure there will be no terrestrial interference to the vulnerable satellite signals operating in the C and Ku bands, it is with some interest that we learn the New Zealand Ministry of Commerce has granted licenses for just such a terrestrial microwave system to Broadcast Communications, Ltd. (BCL), the technical arm of Television New Zealand.

The Digital Distribution Network

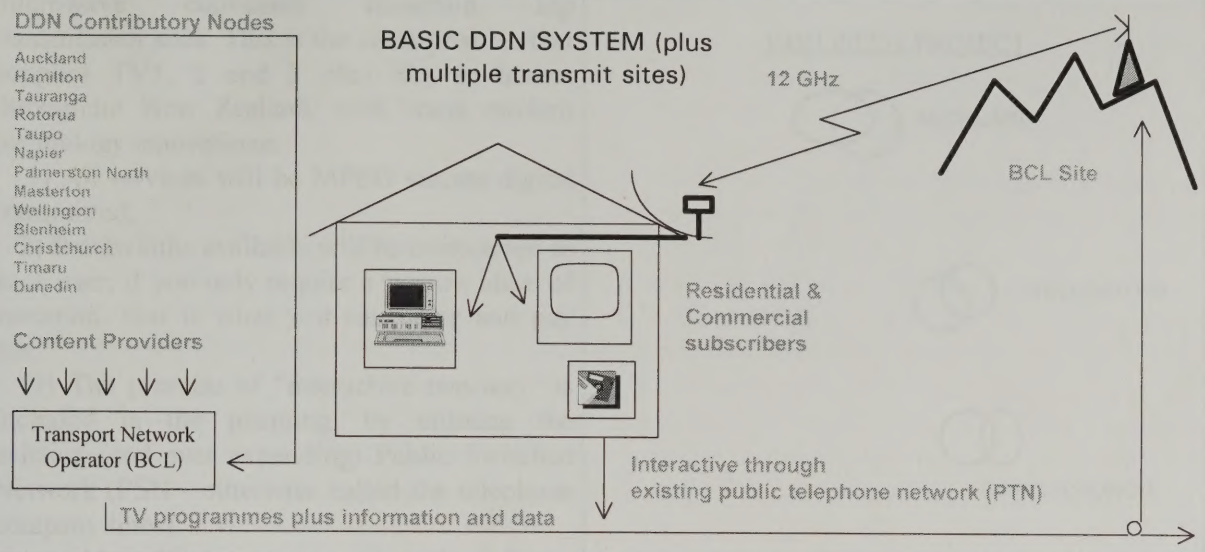
BCL calls their planned service DDN (Digital Distribution Network) and it would occupy, on purpose, portions of the Ku-band frequency spectrum which WARC has reserved and New Zealand as a country has agreed will be reserved for satellite to earth 'broadcasting.' BCL proposes a "nation-wide network" to "provide public or private network services" utilising "licenses from the Ministry of Commerce for all of the frequencies it (BCL) needs to implement a DDN service." BCL is offering DDN distribution to programmers ("Pay TV, Video Conference, Corporate TV, educational TV") "in preference to wideband cable systems." In other words, DDN is intended to compete with cable television bypassing the need to construct a capital intensive fibre or coaxial network.

The system includes two or more 12 GHz transmission sites for each of the major metropolitan regions. (**2**) The transmission site would emulate a "satellite"; that is - using accepted satellite digital transmission technology the site would radiate digital service signals to all of the locations where "line of sight" coverage is possible. At each receive site, BCL notes:

"Reception of the service will be possible using commercially available set top boxes and a small satellite antenna of 60 cm diameter or less. In most cases, in metropolitan areas, a 30 cm diameter antenna or small horn antenna will be sufficient."

1/ Terrestrial Interference (abbreviated 'TI' in the trade) is not uncommon with C-band satellite services and an entire new layer of technology supported by customised products has been built around solving or attempting to correct this when it occurs. Eliminating 'TI' with special equipment is typically both labour and equipment intensive requiring a degree of 'trial and error' to determine the exact nature of the interference and then specifying custom built 'filter' units to correct. At many receive sites it is not possible to correct at all which means some regions affected must simply forego use of satellite linking.

2/ BCL claims, "Extensive field trials in Auckland, Wellington and Christchurch have been conducted and the results verified the design parameters, and choice of transmission sites, for the varying climatic and topographic conditions." And, "Phase 1 of the project has defined a set of transmitter sites providing coverage of approximately 63% of the population, or 770,000 homes passed." BCL defines "homes passed" (a cable TV term that normally refers to the number of homes which cable TV service passes and is available to serve) as "a level of service exceeding 99.9% availability in the average month for a viewer with a 60 cm diameter antenna." Minsitry of Commerce records show BCL holds four licenses for frequencies between 12.214 and 12.486 GHz in the Wellington area as well as additional frequencies between 12.7 and 12.75 GHz for Christchurch and Auckland. BCL also holds 10 licenses for frequencies between 11.9 and 12.2 GHz. Additional license holders in the 12.25 - 12.75 GHz region include police and security agencies.



And the reason for selecting the WARC designated satellite frequency band for this purpose?

"The receiver and digital decoder (Set Top Box or STB) are available commercially for satellite direct to home and wireless cable services internationally, including the Galaxy system in Australia."

By designing the system to utilise commonly available, off-the-shelf hardware, BCL takes a significant step towards service implementation. The Ku-band satellite hardware, of interest, could be configured (ordered) to operate within any of the frequency range segments from 10.7 GHz to 12.75 GHz. Should BCL select frequencies between 10.7 and 11.7 GHz, the same (low cost) hardware would be available and there would be no threat of interference to direct to home (DTH) services in New Zealand. By selecting 11.9 to 12.75 GHz, BCL will come into direct conflict with the forthcoming Sky Network (and other likely) Ku-band programmers. (**3**)

The Premise

At first blush it appears BCL is basing this offering on being a "satellite service provider without the satellite." By attempting to duplicate the technical configuration of a satellite, using satellite reception hardware, and offering digital services identical to those now coming on offer from various satellite providers, BCL is essentially building an on-ground satellite network. It seeks to accomplish this innovation by transferring the transmitters from satellites to BCL controlled terrestrial sites throughout New Zealand.

BCL does not plan to be a programmer for its DDN service. Rather it sees its role as a network operator, providing the technical "wireless trunk" to as many homes and businesses as can be reached from the various transmission sites (see announced site planning, to right, here). In this respect, BCL views itself in the identical role as OPTUS or PanAmSat; "bandwidth for hire." To replace the nation-wide "footprint" from OPTUS or PanAmSat, BCL is building a series of fibre optic and

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3/ The current OPTUS Communications Satellite Network Designer's Guide, p. 71, warns potential users of OPTUS B series satellites that, "interference from terrestrial radio-relay systems ...is significant ... in New Zealand." They further warn planners contemplating use of the OPTUS B series satellites within New Zealand, "to add 14% (signal level) requirement" when planning. Translation? Without regard to specific receive sites or problems created by terrestrial transmitters nearby to the location of the receive (DTH) systems, system designers should plan to use larger receive antennas for OPTUS to compensate for terrestrial interference sources.

One possible net effect of BCL utilising DTH frequencies for terrestrial networking: Significant portions of the metropolitan areas to be covered by the DDN system would not be able to receive satellite signals within some or all of the same frequency band (12.25 - 12.75 GHz) without expensive filtering equipment at each terrestrial location. From the BCL (TVNZ) perspective, this could be a "bonus" to the proposed system: Eliminate DTH into New Zealand by creating so much interference that DTH is impractical here.

microwave connected mountain top transmission sites. This is the same premise that supplies TV1, 2 and 3 plus Sky to homes throughout New Zealand, with some modern technology innovations:

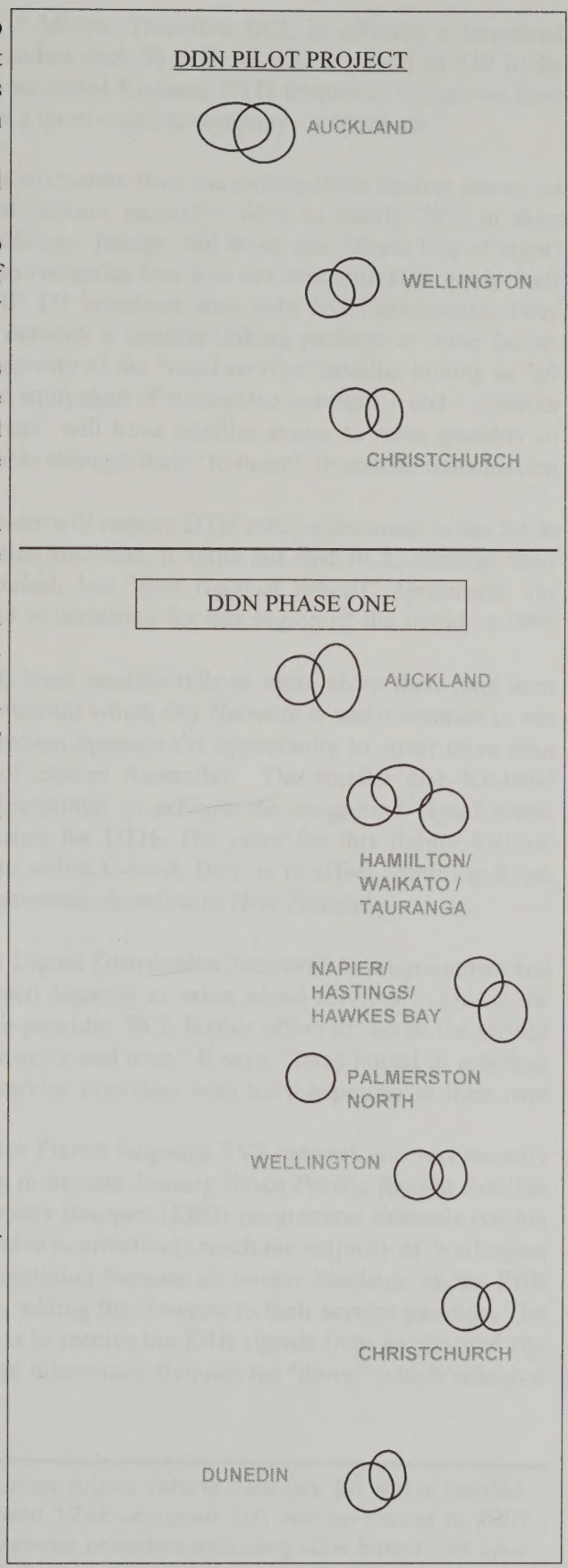
1) All services will be MPEG variant digital transmitted;

2) Bandwidths available will be customised to each user; if you only require a 'narrow slice' of spectrum, that is what you can order and pay for;

3) The promise of "interactive two-way" is included in the planning, by utilising the existing (and ever expanding) Public Switched Network (PSN - otherwise called the telephone company lines).

Although documents released under a "Confidential" banner by BCL have concentrated on the delivery of television programming via DDN, BCL also sees a demand for the delivery of high speed data (private networking between computers) and even "Internet" as a part of the mix. In other words, *anything a satellite can do ... BCL will do with DDN.*

The technical detail of "Service Applications For The Digital Distribution Network" speaks a language familiar to anyone with a working knowledge of satellite provided digital linking. "Programme streams" are "encoded" and then "multiplexed" before transmission. BCL is offering "private network services" capacity in 8 Mbit/s blocks - the same way most satellite relay providers offer segments of transponders. BCL says the sum of all of its bandwidth for hire for each of the centres shown in Phase 1 (right, here) will be 400 Mbits/s. Translate that to how many TV programme channels and you have sport-quality (high motion content material) programme channels requiring 8 Mbit/s of spectrum. In 400 Mbit/s there would be 50 such programme channels. Or to use a lower quality transmission circuit, a VHS quality movie requires a transmission bandwidth in the region of 2 Mbit/s; a total of 200 "TV programme channels." With a mix of high action (rapidly changing images) and slower VHS quality material, the merge zone is half way in between these two extremes: 5 Mbit/s for an "average" requirement which becomes 80 TV programme channels.



Translate that now to satellite transponder capacity. A 54 MHz bandwidth satellite transponder (of the same design as OPTUS, for example) is likely to carry no more than 8 video programme channels

with an average programme channel speed of 5 Mbit/s. Therefore BCL is offering a terrestrial network that will be the equivalent of 10 transponders each 54 MHz in width; a total of 540 MHz. Note that between 12,250 and 12,750 MHz (the so-called Ku-band DTH frequency range) we have 500 MHz of space. In a nutshell, BCL plans to be a quasi-satellite company - a "terra-sat."

Beyond Phase One

BCL's primary, perhaps achievable, objective is to operate from the metropolitan centres shown on page 5. Here it claims various percentages of "homes passed" - 60% to nearly 70% in their documents. They recognise that local terrain, buildings, foliage will block the "direct line of sight" for many potential users of the service. They also recognise that it is not economical to equip their more than 200 existing terrestrial VHF and UHF TV broadcast sites with DDN equipment. They propose to reach "rural areas" by adding to the network a satellite linking package at some future, unspecified date. Their documents describe the capacity of the "rural service" satellite linking as "30 to 40 channels" which in satellite language is the equivalent of someplace between 1 and 3 satellite transponders each 72 MHz wide. Thus "rural areas" will have satellite access to some quantity of programming, but not the full complement available through their "terra-sat" terrestrial transmission points.

Of interest - BCL says their "rural service" viewers will require DTH receive antennas in the 2.4 to 3m size range. This is quite pointedly C-band size antennas. It turns out that BCL, through their existing arrangement with satellite provider Intelsat, has "first right of refusal" agreements for satellite capacity on new C-band satellites Intelsat is launching for this region of the world in 1997 and 1998. (**4**)

That BCL should plan to use a large-antenna C-band satellite tells us more about their long term planning. Unlike the Optus B family of Ku-only satellites which Sky Network is under contract to use for distribution of television, C-band offers the system operator the opportunity to cover more than simply New Zealand (plus perhaps a segment of eastern Australia). The smaller dish Ku-band service depends upon closely focused beams (footprints) to achieve the on-ground signal levels required to support use of small (60-90 cm) dishes for DTH. The price for this tightly focused coverage is a smaller coverage area. In electing to utilise C-band, BCL is in effect admitting it has plans for a service area that extends beyond the immediate shoreline of New Zealand.

The Economics of DDN

BCL intends to "lease capacity on a nation-wide Digital Distribution Network" to programmers and others who will, in turn, "package, market and resell capacity as value added services." This is the same definition one might use for a satellite service provider. BCL further offers to "act as the service operator, interface (the programmer) to the customer or end user." It says, "(we) intend to establish long term strategic relationships with the retail service providers who have expertise in their own particular markets."

An example. Jim Hodgetts is regional manager for French language TV5 network and was recently in New Zealand for two weeks while participating in the late January South Pacific Region Satellite & Cable Show. Hodgetts is well aware the European Bouquet (EBB) programme channels (within which TV5 is one of five television services) is unable to effectively reach the majority of Wellington (and in particular the embassy and commercial sections) because of terrain blockage of the EBB AsiaSat 2 signal. Hodgetts went to BCL to discuss adding the Bouquet to their service package. The alternate (suggested in early 1996 by others, here) is to receive the EBB signals from an elevated site near Wellington and then relay them using discrete microwave frequencies "down" into Wellington proper.

4/ Intelsat 801 is now scheduled for launch on an Ariane vehicle February 25 and is headed for 174E. Once on station and checked out, current 174E occupant 701 will be moved to 180E to replace nearing retirement 511. Several programme providers including USA based UIH hold space segment reservations for 801. Older 511 is operating in near-end-of-life "inclined orbit" mode which means it must be tracked (followed through the sky) with a dish that is capable of motion under directed control. BCL may be planning use of either 801 at 174E or late 1997 - early 1998 to be launched 803 which is scheduled to go to 177E.

In fact, there are more locations within Wellington (and Auckland and Christchurch) where the EBB signals cannot be received than where they can; a function of the very low "satellite look angles" for the AsiaSat 2 satellite. One or more of the EBB programme channels is a potential user of DDN.

While television delivery is one aspect of DDN, it is by no means the only revenue source BCL is investigating. They list numerous other "opportunities to grow a business" and include:

Pay television, home video, educational television, computer game distribution, Internet, datacasting, remote database access, corporate video, corporate education, video conferencing, video distribution, audio distribution, music distribution, broadcast facsimile, electronic courier service. They further suggest: "Broadcast technologies are very efficient and cost effective for one-way, point to multi-point services and, with the new digital signal processing technologies, can be configured to provide private networks. The intention in developing (the) DDN is to provide an end to end distribution service for clients wishing to deliver any digitised information or entertainment service to any individual or group of individuals."

BCL envisions individual homes or businesses will install their own receiving systems (consisting of a 30 - 60 cm antenna in metropolitan areas, an electronics amplifier and converter [LNBF) at the antenna, cabling to the inside and a decoder [set top box]}. Based upon existing models from Galaxy and the projected costs of Sky Network for similar or identical hardware packages, the retail price of this equipment will be someplace in the NZ$1,100 region; installation additional.

Service providers (whether video, data or other) will "deliver" a digital encoded data stream to BCL and this data stream will be multiplexed (before or after hand off to BCL) and encrypted (before or after hand off to BCL) and transmitted. The service provider will also be responsible for its own "subscriber billing" function.

BCL has two planned revenue streams for its own contribution:

1) An annual rate for bandwidth within the system

2) An annual charge for each subscriber (user) signed up by each service provider

Bandwidth (data stream speed) will be in the range of (annual) $500,000 to $2,000,000 for an 8 Mbit/s service rising to $2,500,000 - $5,000,000 for 34 Mbit/s. Recall that within an 8 Mbit/s stream a full motion, high activity level (MPEG-2) sporting event can be "broadcast" with headroom to spare and most "typical" TV programmes require 5 MBit/s "space." BCL also envisions participating in the revenue stream of the programmer by charging a rate per subscriber per annum. The rates suggested here are from $5 per subscriber per year for a service that reaches thousands of users to as much as $5,000 per subscriber per year for services with very limited audience/users.

The 34 Mbit/s rates compare favourably with similar bandwidth capacity on the more expensive Ku-band satellites available to New Zealand; the annual "charge per subscriber" has no similar basis in true satellite delivered systems; BCL is on "new ground" here.

Technical Considerations

BCL remains uncertain of the modulation format for the service. If they elect QPSK, set top boxes are readily available and more reasonably priced each month. The capacity for QPSK would be approximately 36 TV channels.

More promising but presently more expensive and equipment uncertain are 16 QAM and 64 QAM. 16 QAM would allow 90 TV channels (at 3.5 Mbit/s per channel). 64 QAM would allow up to 120 TV channels. BCL notes "(we) intend to adopt the 16 QAM option - the main disadvantage is the likely higher cost of QAM set top boxes and longer lead times (in delivery)." All of this will naturally have an affect on the acceptance and roll out of the planned services since ultimately it will be the consumer who will bear the cost of the set top equipment.

5/ BCL states in their description, "(BCL) holds licenses from the Ministry of Commerce for all frequencies it needs to implement a DDN service." In fact, within the 12.2 to 12.75 GHz Q and S "bands" BCL holds only limited, "test purpose," licenses and these only in Christchurch and Auckland. Licenses held for Wellington interconnect the Beehive to Avalon studios. In the 11.9 to 12.2 GHz region, BCL holds 10 licenses at specified sites in Auckland including Coopers Building, Pine Hill, Waiatarua, Manurewa, and Howick.

TECHNOLOGY BYTES

...BITS and BYTES you may have missed in the rush to make a dollar ...

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Satellite TV and Radio

Laos TV, formerly on Rimsat 41 (130E) has moved to R42 (142.4E), IF 1381. Programming service begins around 1100 UTC (midnight NZST) most evenings (earlier with sporting events some days), format is PAL and material is mixture of cribbed from elsewhere and local. Signal level on this hemispheric beam into New Zealand and much of Australia is in 28 to 30 dBw region which means 3m dishes do well. This transponder was previously used for a number of short-lived services including the 21+ adult and Filipino RPN network. This brings to 3 number of New Zealand viewable services from R42; EM TV (IF 1275) and Asia Net (IF 1481) plus Laos. Rimsat 41 had been scheduled to move from 130E to 148E last October, where it would be used as a temporary Mabuhay satellite for the Philippines. This never happened although all services other than Laos had been "cleared" from R41 in preparation of the move. Why Laos has now moved - does it signal 130E is going to move, now - is unknown.

Chinese SCPC (typically, single channel per carrier) MPEG-2 (DVB compliant, no less) services began appearing on AsiaSat 2 horizontal side December 28 and by mid-January 9 separate new uplinks were functional. CTD understands these programme channels originate at regional TV centres in nine separate Chinese provinces; there are ten programme channels total as Inner Mongolia has both a Chinese (Mandarin) and a Mongol language service channel. The uplinks (9 total) reportedly have been supplied by Philips, a bit of a marketing coup as prior to the first turn on late in December there had been no information released by either the Chinese nor Philips concerning this sizeable project. Receivers, at least the initial quantity, have also been supplied by Philips (model DVS-3950/11) but the ultimate size of the receiver market is unknown. Two AsiaSat 2 transponders are being utilised for the carriage of the nine centres at press time; other possibly non-DVB-compliant MPEG signals have also been observed on AsiaSat 2.

MPEG-2 DVB Compliant receivers. At SPRSCS '97 in Auckland extensive testing using off-satellite signals produced the following observations. Nokia 9500 S, software version 1.63, is presently most versatile receiver available but as SF for February 15th reports, "it does some funny things that make it less then totally consumer

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CHINESE SERVICES NOW IN MPEG-2 DVB - AsiaSat 2

The nine Mandarin (plus other dialects) services are all located on the horizontal side of AsiaSat 2 (100.5E). Eight of the nine utilise a common FEC/Msym setting (FEC 3/4, Msym 4.418); the ninth (Inner Mongolia, Zizhiqu) uses FEC 3/4 and Msym 8.398. There is a single programme channel on each with exception of Inner Mongolia which has a Mandarin channel and a Mongal channel. Frequencies to enter are as follows: 3706 (Henan TV, Zenghou), 3713 (Qinghai TV, Lanzhou), 3720 (Fujian TV, Fuzhou), 3727 (Jiangxi TV, Nanchang), 3734 (Liaoning TV, Shevang), 3830 (Inner Mongolia TV - 8.448 Msym, Zizhiqu), 3840 (Guandong TV, Guandong), 3847 (Hunan TV, Changsha), 3854 (Hubei TV, Wuhan). Some also have a local radio channel. Many (most, in fact) of the commonly available receivers will NOT tune in Msym rates lower than 15(.000) and these services are all below that number. To date, only the Nokia 9500 S (version 1.63 software) and SA 9223 receivers (operated in the MPEG DVB mode) will access these services. The services are apparently DVB compliant with no "funny bit stream data" to restrict access provided the receiver can tune to symbol rates below 15(.000). Pace, Panasat, Samsung and Skandia receivers will not access the services. For totally separate reasons not yet understood, the commercial grade DMV 3000 also apparently will not access these services.

Interest in these Chinese services is keen from a marketing viewpoint - one dish, no motor, single feed that will give access to 10 Chinese programme channels plus as a bonus the European Bouquet service (5 TV programme channels, 12 radio channels) from the same satellite/polarity begins to make sense to marketing people.

UPDATE 02-1: Sky's Plans for Ku Band DTH

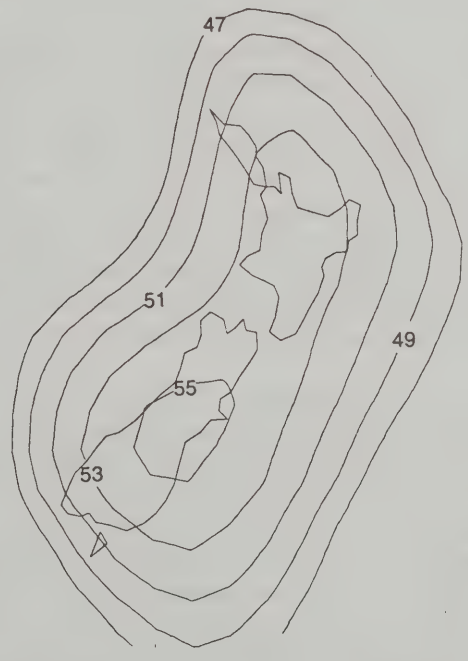
Information released during the South Pacific Region Satellite & Cable Show (Auckland January 21-25) adds some detail to the current plans from Sky Network for implementation of their Ku-band DTH service. Sky will begin with a single OPTUS analogue transponder Videocrypt encoded service supplying Sky Sport; vertical TR5 (12,505 12,559 RF; IF 1205 - 1259). This analogue service will be interim while Sky arranges for MPEG-2 format multiple programme transmission and reception equipment. The analogue receiver contract has been awarded to Uniden (NZ) Ltd; there will be two vendors supplying the digital receivers when they become available. California Amplifier has been awarded "approved" status for the LNBF packages, (The) Winegard Company (Burlington, Iowa, USA) has been granted approved status for antennas. The basic antenna size is likely to be 60 cm although this is still not firmly established because of unknown factors to be reflected in the Msym and FEC rates (the heavier a transponder is loaded, the greater the power backoff required by Sky). In the best case, the Optus B3 beam which is capable of providing an EIRP footprint of 55 dBw for a single analogue carrier (channel) must be backed down 7 dB - resulting in 48 dBw into central South Island, 46 dBw in most of the balance of the country. Given these realities, 90 cm and even larger dishes are very likely.

As many as 15,000 analogue (Sport only) receive systems are forecast to be sold by Sky into areas beyond Sky's present reach between April and the late 1997 / early 1998 turn on of digital. Model SV3 baseband decoders will be used with the Uniden analogue receivers for smart card decryption of the service.

The uplink to Optus is being constructed by Scientific Atlanta with an operational turn-on date prior to 1 April. The MPEG digital receivers now seem increasingly likely to come from Pace and one additional firm. The "late 1997 / early 1998" turn on for MPEG is dependent upon the ability of the receiver supplier(s) to provide the equipment required. When the MPEG units are available, and in the distribution scheme starting at Sky, MPEG-2 transmissions through Optus will begin.

Sky has leased not one but three separate Optus B3 transponders for the full MPEG service; it will utilise half transponder format analogue on an interim basis. The 54 MHz wide B3 transponders are cable of handling 8 full motion video programme channels (Measat in Malaysia is an example of this) or more than 8 with reduced video definition quality. Optus sources tell CTD, "The MPEG service will not share the interim analogue transponder because of problems this creates for balancing the available transmission power between the two dissimilar modulation formats." There had been temporary rumours that MPEG and Videocrypt analogue would share a transponder for a brief period of time. Sky has not revealed how it intends to fill the three transponders (with 24 or more programme channels) and the likelihood is that they will not be full for several years after launch. Various groups including the (New Zealand) Maori television planners are being courted to take some of the spectrum space available.

Decisions as to equipment and operational format will ultimately be influenced by the new majority owners at INL (NZ) when they formally take over the day to day operational reins at Sky. Their influence is already being felt with the indication that Pace will be at least one of (if not the prime) receiver supplier to Sky. Pace is the "receiver supplier" of record to all Murdoch DTH MPEG services world-wide.



OPTUS B3 into New Zealand. For MPEG service, 7 dB should be subtracted from these footprint numbers.

friendly." There are two significant problems facing those who must make or recommend purchase of MPEG receivers at this time. (1) Most receivers were designed for only a portion of the MPEG-2 DVB Compliant 'limited range' of operable parameters. An example of this are the receivers capable of "tuning in" only symbol rates greater than 15(.000) up to some number greater than 28(.000). This immediately precludes such receivers from accessing transmissions with lower (smaller) symbol rates (i.e., below 15[.000]) although such transmissions may themselves be completely "DVB Compliant." (2) Uplinkers continue to insert data stream "bits" which rather purposefully deny access to their services unless a specific brand and model of receiver is being used. This is not conditional access - it is limited access designed to force sale of receivers. SF for February 15th suggests the DigiSkan 888 "for consumer use to access European Bouquet and NBC (which will not remain free to air indefinitely)" but warns the industry that the Nokia 9500 S version 1.63 software, "while enticing, is not quite what we need here in the Pacific for full access to the myriad of non-conditional access services."

AsiaSat 2 STAR service, a few programme channels of which remain FTA with the "right" MPEG-2 receiver, are scheduled to become conditional access (CA) at an "early date." Hold up is the manufacture of DMV professional model IRDs which have the ability to include a conditional access module. The DMV 3000, now widely used by cable and other professional installations in Asia and Pacific, were not equipped with CA modules. When this is sorted out, expect Sky News Australia and STAR TV Japan to "disappear."

Panasat IRD 630 is latest version of this early entrant MPEG DVB receiver. New unit, said to have improved software and more reliable operation, is selling in range of Australia $700 through Antares Satellite Products (Queensland tel/fax 61-7-3205-7574) and shipping is ex-stock.

Long Time Technology, another Taiwanese firm, is distributing samples of their model 9500 (same number as Nokia!) MPEG-2 DVB digital receiver. Units are available in Beijing at US$1,000 (although 100% duty applies there) and receivers have been found to work satisfactory on the European Bouquet service. However, it apparently will not receive the NBC services on PAS-2.

Skandia SK888 receiver, designed to function with European Bouquet from AsiaSat 2, also works when equipped with CA module and smart card, on Galaxy pay TV service channels.

Italian European Bouquet broadcaster RAI International plans extensive revision of both operating schedule on AsiaSat 2 and programming content, according to Giovanni De Luca, representing broadcaster at SPRSCS '97. He told delegates to show RAI plans to create programming schedule that recognises Asia and Pacific region as being distinctly different from Rome and indeed programming times have already shifted to coincide with the evening viewing hours in New Zealand (and Australia - until this very recent change, there was no programming after approximately 6PM NZST). There are many additional planned changes for the coming 90 days: RAI will launch a 30 minute daily English language newscast concentrating on news items from the Asia and Pacific (as early as March), and will redesign their programming schedule to bring both sport and drama into the region. The target is 4 hours per day in English within six months. Some of this will have English dubbing or subtitles. There is also a plan to launch a "Fanta Sport" programming package as early as May. Fanta Sport is a viewer participation event and each participant becomes a "team manager" for a sporting event (such as a tennis match, rugby or field hockey). There is one nagging problem: As reported in CTD for November 29 (#9609, p. 5), prior to the launch of RAI International programming on As2 satellite, a Saudi Arabia firm (Dallah Albaraka Holding EC) held a distribution right for RAI into Australia. This agreement has 11 more years to run, and was negotiated at a top political level. According to Giovanni De Luca, Australia as a "market" is not a part of the planning for the growth of RAI International. They recognise that As2 service is available in Australia, but do not feel they can consider the needs of Australians in their programme scheduling or planning as long as the agreement with the Saudi firm is in effect. This does not preclude Australians from installing dishes and viewing the RAI service (certainly in Melbourne it is already very popular), but Australian satellite dealers should not expect direct support for their marketing from RAI.

Under discussion: During SPRSCS '97, representatives from TV5 Paris, RAI International and Deutsche Welle all admitted that there is at least a chance their present European Bouquet service on AsiaSat 2 (100.5E) may move to AsiaSat 3 when it goes into service in December of this year. AsiaSat 3 will replace AsiaSat 1 and by being at 105.5E will present a "higher elevation angle view" for New Zealand. This could resolve many problem reception areas we presently have with As2. "Preliminary discussions" have been held with AsiaSat representatives on this issue. AsiaSat 2 is largely controlled by STAR TV (Hong Kong) and there are reported to be agreements in effect between AsiaSat and Star which preclude any "commercially sponsored or pay television users" from taking transponders on As2, other than the STAR TV services. Star began with 8 transponders on As2, has since dropped to six of which only two are presently in use. No such restrictions apply to AsiaSat 1/3 at 105.5E. The European Bouquet partners are interested in being in a "better neighbourhood" and expect As3 will have so much DTH programming on board that it will attract a far larger number of DTH viewers than As2 does. It is in their best interest to be on the satellite (i.e., "neighbourhood") that attracts the largest number of dish viewers.

National Business Review (31 January) carried report on European Bouquet and brief interview with TV5 Paris regional managerr Jim Hodgetts who was here fo the SPRSCS '97 show. Hodgetts told NB, "I expect growth to be carried along by the development of the cable TV industry and by interest from viewers willing to install dishes."

STAR TV has moved several of their previously free to air services on AsiaSat 2 (3900 MHz, vertical) to 3700, conditional access. VIVA Cinema (a Filipino movie service) is no longer on the 3900 transponder; CNBC and NBC Asia are listed in the menu for 3700 as well along with STAR Movies SEA (Southeast Asia - Chinese) and Star Chinese Channel. The DMV 3000 acknowledges presence of these (3700 MHz) programming channels but will not access the actual programming.

Satellite failure. Telstar 401, a domestic C-band satellite covering North America and owned by AT & T, abruptly ceased operation January 16. The satellite was the main analogue transmission system for PBS (Public Broadcast System) and also provided video/audio links for (American) ABC and Fox networks. Users were moved to Telstar 402R but because of limited space on 4092R separate programming channels were converted from analogue to compressed digital "to make everything fit." 401 was launched in 1993, built by Lockheed Martin.

New Zealand Catholic (publication) dated February 2 devotes several hundred words to description of new availability of Eternal Word Television Network (EWTN) and gives source for $3,700 "total cost" system which is available according to the report from Palmerston North supplier Telsat Communications, Ltd. Article describes humble beginnings of EWTN, founder Mother Angelica and notes, "After installation, the network is free to viewers." EWTN is transmitted in PowerVu MPEG-2 format on PAS-2 satellite in bouquet that includes mixture of conditional access and FTA programme streams.

EWTN is modifying telecasting schedule to the Pacific and Asia region 1 April. Timings of individual programmes are being significantly modified using "Sydney time" as a Pacific base reference. "Cinema" (movie) presentations are being added five days per week with twin showings each day, children's programming is expanding and being regrouped into time blocks.

ESPN, presently on PAS-2 and C2M in B-MAC encryption, is probably planning a change to PowerVu format sometime this year. During February ESPN has initiated PowerVu feeds on several American and European transponders. On PAS-1, serving Europe, ESPN has four separate programme channels active (ESPN transatlantic, ESPN 2, ESPN USA and ESPN Latin America).

February 25 scheduled launch of Intelsat 801, if successful, will begin a series of steps that will have significant impact on satellite viewing options in New Zealand by mid-year. The satellite will go to 174E where it will replace year-old 701. Then 701 will move to 180E where it will replace old, tired 511 (which has been in moving, inclined orbit for several years). Tests of 801 could begin from a location near 174E as early as mid March but are more likely around 1 April. Transfer of 701 to 180E is not likely before June. With 801 in place and 701 at 180E, major changes will then begin. On 701 at 180E, French RFO service will switch to an Eastern Zone beam which will pretty well end any use of this service west of 160E. The good news for Tahiti and other nearby areas within the new zone beam is that signal levels will be 33 dBw which will be several dB hotter than the present 511 service. There are also reports that RFO 2 will begin service from 701 at 180E. In New Zealand and Australia, 701 at 180E will produce signal levels in the 33 dBw range as well but on a (south) western zone beam; again, an improvement in levels from 511 by 4+ dB. From 174E, 801 is the first of an entirely new family of Intelsats. This series has 36 C-band transponders, 30 of which will generate centre of footprint 36 dBw power levels - effectively the hottest signals in the sky for New Zealand and Australia. The remaining 6 transponders are 29 dBw but global in beam coverage; the equivalent of the best transponders on the present 511 bird. From 174E, 801 has a number of significant clients with reserved space. Most prominent of these is United International Holdings (UIH) which plans a sizeable bouquet of MPEG-2 programme channels to cable television (and possibly other commercial SMATV) accounts. UIH has a target start-up date of 1 July, to coincide with the lifting of the present restrictive regulations that have kept Australian pay TV "clean" for Australian programmers to date. Others with reserved space (although there is no guarantee they will actually take the space) include Papua New Guinea's include EM TV, a New Zealand group planning a Maori communications network, and a New Zealand group trying to put together a ten programme channel DTH package. EM TV is likely, if they follow through with an Intelsat plan, to take a Northwest zone beam which is bad news for viewers south of the equator as the footprint will be well below home DTH (and most cable) viewing (signal) levels on that beam. By midyear there is likely to be significant, new, television programming available through both 801 at 174E and 701 at 180E. And that is hardly the end of the changes: I805 is scheduled to 110E during the coming 12 months in partnership with China (visible and possibly providing some service ion this direction as well) while 803 will go to 177E to replace 703 very late this year. Intelsat, long a less than full participant in satellite television broadcasting into the Pacific, becomes a major player during the coming 12 months.

Indovision officially launched 19 channel MPEG-2 service using Palapa C2M satellite January 14th. Service is distributed on C2M beam which does not come south (into Australia and New Zealand), requires newly available Pace receiver (DVS-211-GP) which is being distributed initially only in Jakarta. Included in programming package are HBO Asia, MGM Gold, ESPN Asia, Discovery Asia, CNN, TNT, Cartoon Network, NBC, CNBC, various Star services and BBC World. Transponder is heavily 'loaded" with FEC of 7/8, which closely approximates analogue requirements for threshold reception.

New Zealand Maori settlements throughout the country would be interconnected via a Ku-band two-way network system if plans discussed during SPRSCS '97 bear fruit. A Wellington based group is investigating a network plan that would create nearly 850 receive sites throughout North and South Island, feeding to each site educational materials for Maori school children as well as adult training in non-school hour periods. The study is in the formative stage at this point but property for a Ku-band uplink has been secured in Wellington and research is being conducted on computer software to implement the project. The original plan was to utilise a C-band link and in fact a reservation for C-band using Intelsat is in place. However, after discussing the plan with industry leaders at SPRSCS '97, the swing now is towards Ku-band.

European BSkyB has placed order for 1,000,000 digital IRD units hoping to have production quantity units available for rollout of European 200 programme channel system by mid-year.

Hughes, which pioneered Ku-band DSS (DTH) satellite service in North America and more recently DirecPC access to Internet, has shown a logical follow-on to both: A single Ku-band terminal that receives DSS TV programming and connects your PC to the Internet. System employs dish with two offset feeds as TV is transmitted from separate satellite from DirecPC. In reverse scenario, IBM is first PC manufacturer to sign deal with Hughes to turn their PCs into DSS TV receiving system. IBM Aptiva "Stealth" PCs will carry in-built ability to receive and process DSS TV reception in addition to normal PC functions, and the DirecPC tie to Internet as well.

Serious penalty. Residents of Meade, Kansas, approximately 2,500 people, have ordinance on books making satellite dish of <u>any</u> size illegal without city permits. Growth of DSS/DTH has produced number of dishes in community and officials are threatening $500 fine plus cutting off (municipal owned) electrical supply unless residents take down dishes. Community has cable TV system in operation serving 550 of 700 homes.

Wanna buy a high power satellite? TCI, the cable giant, is stuck with Tempo 1, a Ku band satellite it intended to operate from a Canadian orbit spot and to share between US and Canadian DBS broadcasters. The Canadian government first said yes to deal, then no, then yes ...you get the idea. Now deal seems really off, and Tempo has US$300m or more invested in satellite that can deliver several hundred TV programme channels to dishes in 50 cm class. The satellite is ready to go - all you need is a deal to buy it.

Digital TV and Radio

HDTV kick-off in US may occur as early as mid-1998 but retailers are wary of immediate consumer interest or acceptance. All major TV set producers are retooling to offer consumer sets but retailers believe the first sets will be overpriced and that picture sizes will be primarily in the big screen area. Suggestions that pricing will be in range of US$2,500 to $4,000 (up to $1,500 more than NTSC sets of same screen size) and that picture size on initial receivers will be at or over 35" is causing concern at retailer levels. Fears that agreements in December to allow HDTV to proceed might dampen consumer interest in existing NTSC format receivers have so far proven unfounded; in particular, large screen (direct view and projection) sets continue to set North American sales records.

Consumer Electronics

Broadcasters may deny they increase audio level during commercial breaks; Thomson (RCA) TV receivers in 1997 will provide "sound leveller" which is being promoted as "device to lower commercial announcement sound levels to those of programming."

CD-DVD by Sony will finally make formal (US) debut in April. Although many software and distribution problems remain to be sorted, Sony will release (US)$1,000 price region model DVP-S7000 combination CD and DVD (video CD) player as well as participate in initial release of up to 50 movie titles with Columbia TriStar Home Video. Even with Sony and other possible hardware introductions before midyear, the movie distributors remain silent on how and when they will support the equipment with titles.

Korean Daewoo purchase of Thomson Multimedia remains on hold while French bureaucrats attempt to sort out conflicts. Thomson SA is state owned and consists of profitable defence contract group as well as very unprofitable consumer electronics group. In complicated deal, French Lagardere (Matra) which is also in the defence business would have taken Thomson out of government hands, retaining the defence portions but spinning off the money losing consumer electronics portion. Korean Daewoo was to acquire the consumer portion. French pride interrupted the transaction and Daewoo quickly insisted it would add as many as 5,000

new (French) jobs to Thomson under its control, hoping to quiet French fears that Daewoo meant to strip Thomson. The multimedia group has a debt of US$2B, perhaps as much as $3B, and deciding who will swallow that has also complicated the process. At one point the French government agreed to cancel the debt if Lagardere + Daewoo would simply haul away Thomson and its parts. Now with the French public involved and the issue having become a political debate, all bets are off.

Philips, itself cutting back staff world-wide, will become "passive, minority investor" in money losing German Grundig. Philips will instantly save US$28.5m annually by no longer being required to pay that amount annually to 'Max Grundig Foundation' which benefits heirs of firm founder. Grundig responds by announcing it is "opening itself to new partners." Philips admits to US$950B losses in Grundig since 1984 agreement went into effect. Grundig will cut 1/3rd of work force immediately in wake of US$160m loss in most recent year.

CES (show) Las Vegas was point of first display for new generation of highly competitive Web browsers; the TV receiver industry has suddenly decided there may be money in turning channel surfers into Web browsers. Most of the major brands will introduce Web browsing attachments for TV sets by midyear, nominally priced from US$350 upwards. Major brands exhibiting at CES with this line of products included Akai, Hitachi, Mitsubishi, Proton, RCA, Sanyo, Sega, Uniden and Zenith. Sony and Philips already have product in this area.

Tandy Corporation (Radio Shack) has pulled plug on 17 massive "Incredible Universe" stores. Firm began project four years ago, seeking to develop new retail store format that contained in each location virtually everything anyone with an interest in electronics or media would be interested in purchasing. Shortly after announcing shutdown of "IU" stores, Tandy released plans to open 1,000 new "store within a store" outlets over next five years; basically, Radio Shack "departments" staffed as stand alone outlets within other existing retail outlets. By paring down product in stock depth, Tandy plans 1,700 square foot outlets in 400 square feet of space augmenting lack of actual stock with new regional same day delivery warehousing.

Cable/Fibre/MMDS/Pay TV

Demonstration of the MediaNet version of Internet during SPRSCS '97 was a disappointment; it did not work as promised but through no apparent fault of the service itself. MediaNet is carried within the vertical blanking interval (VBI) of European Bouquet broadcaster Deutsche Welle which has backed the project with funding. Deutsche Welle representative Johannes Firsbach brought to the annual show the complete hardware to allow a cable TV system to interface with MediaNet and a home style MediaNet "decoder" to display the results. The weak link proved to be the $100 price range consumer style decoder which between Germany and New Zealand suffered a transient voltage spike that wiped out a Siemens memory chip essential for its operation. Tests indicated the VBI signal arrived through the satellite relay intact and were available to the decoder in proper form. A similar test demonstration was scheduled for the European Bouquet stand during the Sydney Cable and Satellite show February 4-6. Cable operators learned they will be required to purchase a DMV 3000 receiver and equip it with a MediaNet DMV designed "board" to pull the Internet data stream out of the digital VBI portion of the DW signal. From there it goes back into the cable system headend modulator along with the analogue format video and audio. The special board for the DMV 3000 is priced near NZ$1,000; one per cable system will be required. Decoders in quantity (one will go to each cable home subscribing to the optional MediaNet service) are scheduled to be available early March. One additional SPRSCS '97 announcement:" Between 1,200 and 2,000 separate shareware programs will be distributed "free" to MediaNet users each month.

Banking industry representatives from Westpac and BNZ attended SPRSCS '97 Auckland show, paid particular attention to January 24 sessions detailing the challenges facing cable TV operation in New Zealand. Both banks indicated they are establishing corporate guidelines for cable TV loan applications, BNZ said it will try to recognise the "cash flow value" of subscribers and hopes to create a loan programme that makes funds available as a function of the system cash flow rather than depending totally upon tangible (equipment, real estate) assets. No "cash flow basis" cable loans have yet been made in New Zealand to cable operators.

American cable TV leader John Malone (TCI) is calling for "cable TV to begin thinking about a legitimate return on our invested capital." Malone, addressing gathering of cable operators, warned "We have the lowest return on investment capital of any major industry. We must change from junk bond financing to an investment grade rating."

Cable TV modems, for high data rate (10Mbit/s or greater) Internet access are growing at penetration rate of 1% per month. Modems are now on offer to only small percentage of total cable system subscribers in US. Systems are finding from 2 to 4% of their subscribers "instantly acquire modems" when first available, then growth continues at 1% rate. Added benefit for cable TV systems: 25% of those ordering modems are not subscribers to cable TV itself, thus increasing cable penetration through Internet access packages. Early reports suggested when there was heavy cable TV modem use, data rates will decrease. They do: one system in New England provided subscribers with 27 Mbit/s downstream data rate, measured it dropping to 3 Mbit/s when 400 simultaneous users were "on line." More study is promised.

HEAD TO HEAD - At Least On Paper
Channel line-up of Saturn (left) and First Media (right) as of January

Channel Line-up

Effective as at 1st August 1996

01 TV1
02 TV2
03 TV3
05 Weather Channel
07 On Screen Guide
09 Regional Channel Capital TV
10 Discovery
11 NBC US Network
12 TNT Movies
20 Trackside
22 CNN International News
24 ABN Asia Business News
25 CNBC Business
27 Cartoon Network
29 Kidzone
30 TV Shopping Network
32 CMT Country Music
34 RFO French
35 NHK Japanese
37 Elijah Religious
38 Worldnet US Information Service

ONE	Channel 1
2	Channel 2
CNN INTERNATIONAL	Channel 6
TV	Channel 8
ATV	Channel 9
CAPITAL CITY	Channel 9
1st ENTERTAINMENT	Channel 10
THE BOX MUSIC TELEVISION YOU CONTROL	Channel 11
CARTOON NETWORK	Channel 12
KIDS TV	Channel 13
TNT	Channel 14
新視	Channel 16
CNBC	Channel 17
LOCAL LINK	Channel 19
weather watch	Channel 20

Note: First Media does not carry TV3 because of disagreements concerning copyright payments.

The Golf Channel has notified New Zealand cable operators it is planning a "midyear (1997) launch of its programming into Australia and the South Pacific." The service began transmissions using PowerVu MPEG-2 through the PAS-2 California uplink last July, was free to air until January 16th. The primary customers are in Japan where cable TV and DTH service Perfect TV! carry it to subscribers on an optional (ala carte) basis. The channel is not specifying what the per home cable charge will be for the service but is suggesting "it will not be cheap - more than the usual (US) $1 per cable home per month now being charged for other services." The Perfect TV service presently charges DTH viewers the equivalent of NZ$12.50 per month for the service - ouch.

Formal announcement of majority stock purchase by Murdoch INL group of Sky Network continues to be withheld; sources close to the deal report there are no major hitches, only ongoing fine tuning of the agreement. Sky executives now freely admit the sale is "done" but will not discuss details. To kick off Sky satellite service 1 April, Sky is considering an "official launch" in the Chatham Islands. Concept is that Chathams is badly served by normal TV (it boasts 1 satellite dish for every 12 households, very high by New Zealand standards) and Sky can gain public relations mileage by introducing the Sport Channel service "out there" with TV cameras and news coverage to properly record the event.

US cable operator Lenfest, with financial ties to Australia pay TV, has agreed to pay US$5m in royalties to US Copyright Tribunal to settle civil suit brought by programmers. Lenfest VP Harry Brooks has taken corporate responsibility for under reporting his cable system revenues which temporarily saved his firm

US$2.4m in copyright fees. Brooks has plead guilty to filing false statements and could receive up to one year jail term when sentenced in March.

UIH in Europe, in partnership with Philips, is rumoured to be under threat of Philips withdrawal from cable TV. UIH is owner of Wellington region Saturn Communications in New Zealand.

UIH lost US$49.4m in quarter ending November 30, up from $25.9m loss in same quarter year ago. Firm had previously announced plan to raise US$250m in new expansion funds for Pacific and Asia but has now postponed that offering citing "weak financial markets" as reason. UIH board approved US$9.1m go ahead expenditure for launch of 18+ channel cable TV digital bouquet into Pacific, now rescheduled to July 1 via new Intelsat 801 at 174E.

US cable TV homes grew by 2 million homes during 1996 while competitor DBS grew by 2.3 million. Cable now reaches 89% of all multi-channel homes in USA, down 2% from 1995. Further evidence that DSS/DTH is gaining ground in North America: TV Guide, prestigious weekly that divides USA into regions to tailor programme listings to channels received, will launch "national edition" for DSS/DTH shortly; expects up to 700,000 subscribers first year. It will be larger than regional editions (which routinely detail cable as well as broadcast TV); 300 versus nominal 180 pages.

Consolidation within German cable TV industry continues: 1 million subscriber Verbacom has purchased 550,000 subscriber Urbana Systemtechnik.

Terrestrial Broadcasting

"Different lifestyle" groups, including gays and lesbians, have reportedly won access to a new TV channel for Auckland, Dunedin and Christchurch, but not Wellington. Sky Network had been one of the bidders for the new UHF assignment, virtually the last to be available for Auckland.

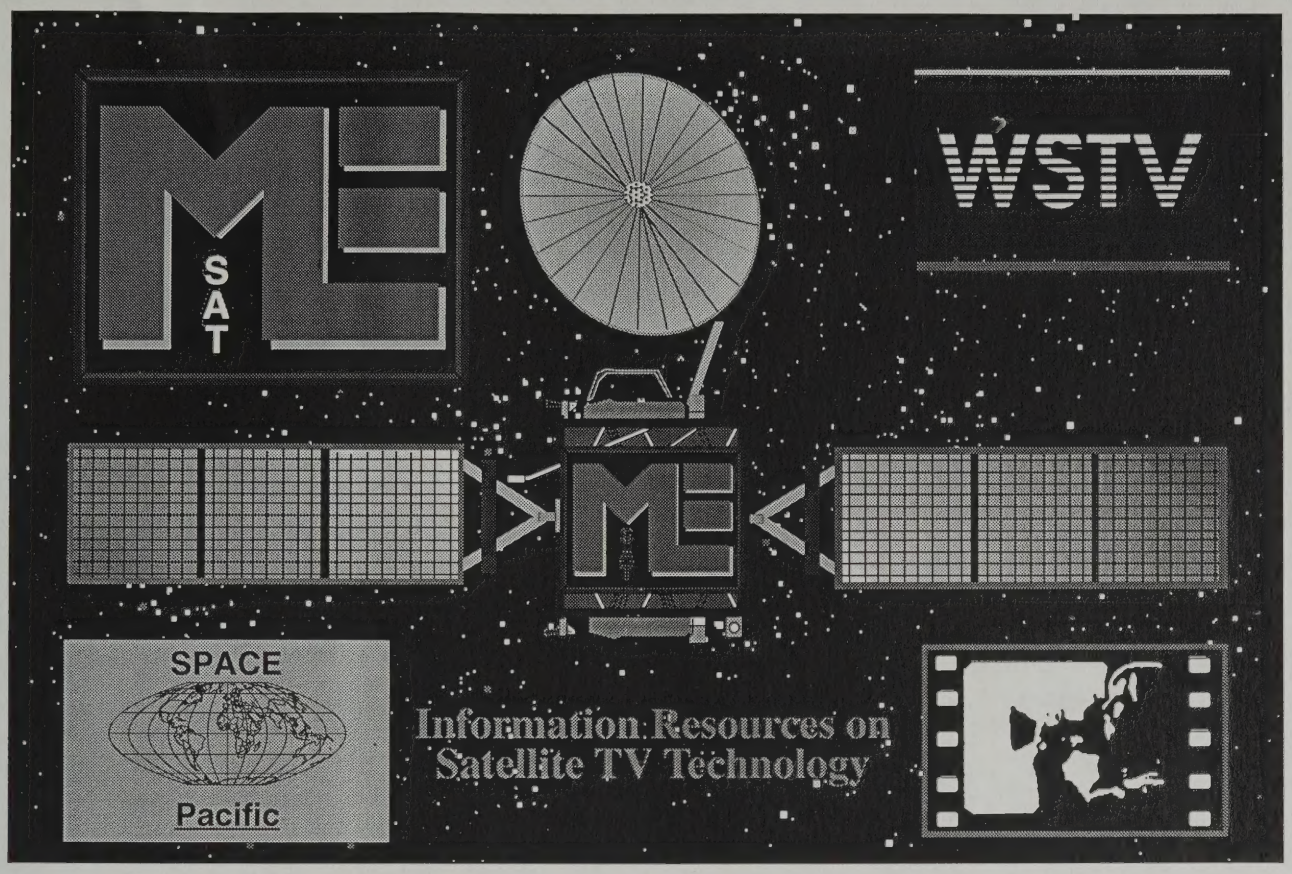
SMPTE '97 (Society of Motion Picture and Television Engineers) scheduled July 1 to 4 at Sydney's Darling Harbour Convention and Exhibit Centre. Theme is 'New technology, New Opportunities'; information from (tel) 61-2-9899-6987, (fax) 61-2-9680-1248.

Post show press conference. 1997 Australasian Cable and Satellite Television Exhibition which convened in Sydney at Darling Harbour February 4 - 6 will be followed with "press conference" at 1PM March 4 (Hall 5, level 1). Speakers include Will Berryman - Director of International Multimedia Development for programmer Nickelodeon, Don Hagen - Vice President Asia Pacific for Austar, and Vernon Yen - Regional Director, Broadcast Services for PanAmSat (satellite operator). Details, press passes from Danielle Fischer tel 61-2-9210-5715.

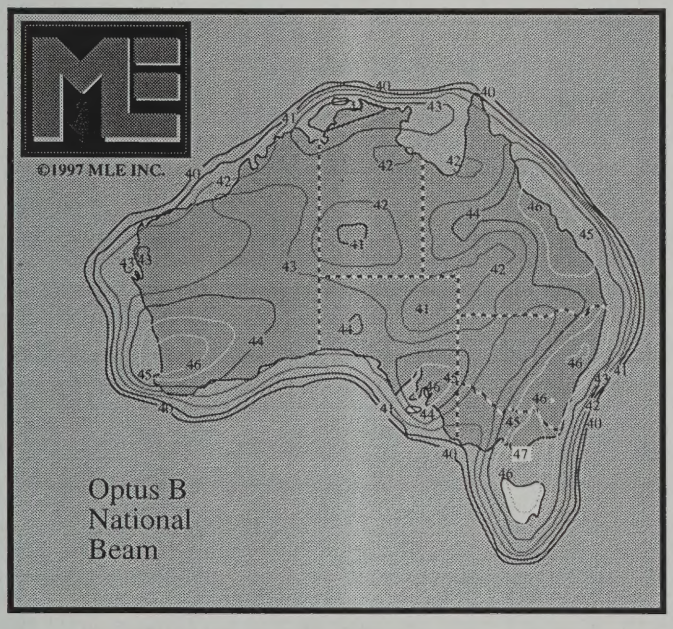
American TV networks, after years of squabbling about assigning programme ratings, began placing 15 second rating classification at start of each programme January 2nd. Final decision on actual makeup of rating system and administration of same remains unsettled.

Daytime TV ratings in America of big-three networks against the combined audience of basic cable networks continues to narrow. Ten years ago, big-3 commanded 64.2 'share' of daytime audience. In latest results, cable has climbed to 31 share while networks have dropped to 40.9.

"Conformal VHF/UHF" receiving antennas which attach to and conform to the curvature of rear side of Ku-band DTH home satellite dishes have been announced by two US firms. With increasing penetration of US homes by DTH satellite programming packages, homes switching from cable to satellite for their TV are left without reception from local, terrestrial TV stations. Separate VHF/UHF antennas to allow local reception has not been popular; viewers have simply elected to ignore "local television." New antennas "wrap to" contour of dishes already in place but still require separate cable run to TV set.



http://www.cm.ksc.co.th/~mlesat



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Published by:

MLE (Thailand) Co. Ltd.

124 Chang-klan Road #110
Chiang Mai 50300 Thailand